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ABSTRACT

This project identified statistically significant predictors of first-year retention among 1991-92 freshmen who were enrolled in a rural midwestern comprehensive college. Results of a step-wise discriminant analysis indicated that college grade point average (GPA) was the best overall predictor of retention of first-year students (n=376). Results from semi-structured interviews with 12 of the students suggest that personological factors mediate the effects of cognitive variables. Nine factors affecting college selection and persistence were identified, such as financial concerns, college proximity to hometowns, student goals, emotional support from family and friends, social integration into campus life, and academic difficulty. Decisive factors included parental encouragement and parental financial and emotional support. The study concludes that student GPAs may be convenient but superficial substitutes for pervasive "internal" (personality) dimensions like developmental maturity. An appendix contains interview questions. (Contains approximately 90 references.) (JDD)

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Predicting Rural College Retention among First-Year Undergraduates

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1994

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Running Head: PREDICTING RURAL COLLEGE RETENTION

Abstract

This project identified statistically significant predictors of first-year retention among 1991-1992 freshmen who were enrolled in a rural, midwestern, comprehensive college. Quantitatively, first, the results of a step-wise discriminant analysis indicated that college GPA was the best overall predictor of first-year retention. Second, the profile of significant predictors expanded from cognitive to include psychosocial measures when the data was stratified by gender and by ACT composite-score levels. Third, the classification rates derived from the discriminant analysis ranged from 76% for students scoring within the interquartile ACT range to 87% for those within the top ACT quartile. Qualitatively, the results from semi-structured interviews suggested that personological factors mediate the effects of cognitive variables. In conclusion, predictive retention models utilize, as structural modelers suggest, overt (i.e., college-impact) and covert (i.e., developmental) predictors.

Predicting Rural College Retention among First-Year Undergraduates[1]

> . . . retention is the only strategy that is directly under the control of the institution . . . it appears that the most efficient approach to maintaining or expanding undergraduate enrollment lies in better retention of students once they are enrolled. (Porter, 1989, p. 2)

> Let me then conclude with a warning that we social scientists would do well to hold back our eagerness to control that world which we so imperfectly understand . . . Rather, our studies could be inspired by a more ancient, but today less honoured motive: . . . curiosity . . . .
> (Bateson, 1978, p. 240)

This data-based investigation of one-year freshmen retention included two (2) research studies which, together, painted a comprehensive portrait of first-year undergraduate retention at one rural, midwestern, comprehensive college. Study 1 analyzed the predictive contributions of pre-college and pre-existing correlates (e.g., Astin, 1993b) and first-year college GPA; the results of the step-wise discriminant analysis (DA) were compared to Roweton, Bare, and Barnes' (1991)

findings. Study 2 explored the academic and social integration dimensions of Tinto's (1975, 1987a) student integration model using semi-structured interviews with first-year students. Study 2 highlighted personological variables not currently recorded in the College's Student Information System (SIS) (Information Associates, 1989).

Predicting Retention

The understanding of student retention by post-secondary professionals is maturing empirically and theoretically. Conceptually, American psychology's human development models now more comprehensively than ever describe the effects of salient college variables upon student growth (Pascarella & Terenzini, 1991, pp. 18-50). Until 1970, developmentalists " . . . offered almost no discussion . . . after adolescence" (Singer, 1968, p. 608) except for superficial psychological references to Erik Erikson (1963, 1968; also see Keniston, 1971). Today's attrition researcher no longer lacks theory nor data.

Empirically, relatively inexpensive but statistically powerful software now allows college-

retention institutional researchers to challenge data-stratified multivariate designs expeditiously. Earlier approaches, like canonical analysis and discriminant analysis, are, today, supplanted by structural modeling (see, for example, Loehlin, 1992). Statistical software like LISREL[2] (Joreskog & Sorbom, 1989), EQS (Bentler, 1989), EzPath (Steiger, 1989) and CALIS (SAS Institute, 1990b) link inferred causal paths between overt variables to other overt variables (i.e., measurement models) or to latent variables (i.e., structural models). Latent variables, in turn, are generated statistically by factor, path, as well as by structural analysis (Loehlin, 1992).

The application of structural analysis to retention data is growing. First, structural models tolerate substantial error variance, a pesky psychometric puzzle indigenous to too much psychological measurement. Second, path models are limited manly by large sample sizes, the researcher's capacity to weave convincing narratives from relevant research, and, of course, third, by generalizability. Fourth, however, structural models are not experiments,

and the recursive causal paths, no matter have "obvious", remain probabilistic.

The appeal of causality over correlations is compelling in spite of structural modeling's interpretive snares (Bollen & Long, 1993; Loehlin, 1992). As Miller (1991, p. 290) indicates, " . . . path analysis is not a method of discovering causal laws but a procedure for giving a quantitative interpretation of an assumed causal system . . . " . The value of path analysis depends totally on the validity of causal explanations underlying the research (Smith & Glass, 1987, pp. 187, 190). Path analysis never conclusively confirm any causal structure. Rather, path-analytic explanations remain speculative until collaborative experimental evidence develops.

"The uninformed use of sophisticated analytic routines," as retention-researchers Pascarella and Terenzini (1991, p. 3) remind social scientists, "is often more likely to obfuscate and misled than to clarify."

Our ability to interpret data meaningfully defines the ultimate value of any research. "The ability to

obtain statistical analyses," William Estes (1991, p. 2) concludes from recent history, "soon outruns . . . [our] ability to interpret them."

Explanation

New statistical tools and maturing psychological theory stimulated college student-change research during the last three decades. Pascarella and Terenzini (1991, pp. 15-61) divided this burgeoning college student-change literature into (1) developmental models and (2) college-impact models.

Developmental models

The developmental student-change literature sorted into five (5) categories (e.g., Pascarella and Terenzini, 1991, pp. 18-50):

(1) psychological theories (e.g., Chickering, 1969; Ellison & Simon, 1973; Rodgers, 1980; Thomas and Chickering, 1984; Widick, Parker, & Knefelkamp, 1978a, 1978b);

(2) cognitive-structural theories (e.g., Perry, 1970, 1981);

(3) topological models (e.g., Claxton & Murrell, 1987);

(4) person-environment interaction theories (e.g., Strange & King, 1990); and

(5) psychosocial models.

Most age-stage developmental models viewed college-student change as universal stages of internal growth, be it one "vector of development" or several (e.g., Chickering, 1969). Psychosocial developmental models emphasized maturational "tasks" with which college adolescents, for example, cope.

Psychosocial developmental approaches, like James Marcia's (1965, 1966) ego identity status model and Douglas Heath's (1968, 1978) maturity model, were especially relevant for college-age maturational issues. Other psychosocial researchers focused on minority student attrition (Bennett & Okinaka, 1989; Castle, 1993); on specific groups like blacks (e.g., Cross, 1971), Asian-Americans (e.g., Sue & Sue, 1971), Hispanics (e.g., Martinez, 1988), Native Americans (e.g., Johnson & Lashley, 1988); or on certain college-student ages (e.g., Moore, 1990; Vaillant, 1977).

College-impact models

College-impact models investigated external indicators, that is, the predictive power of correlates "outside" the student and/or pre-existing to college. College-impact models, unlike developmental ones, focused on environmental and sociological stimulants. Typical research investigated . . .

(1) student-input or pre-college characteristics;

(2) structural or organizational traits like college size; and

(3) college environmental factors.

Examples of college-impact models included Astin's (1993b) theory of involvement; Bean's (1980, 1982, 1985, 1990) student attrition model; Bean and Metzer's (1987) nontraditional undergraduate student attrition model; Pascarella's (e.g., 1985) path models; Stahl and Pavel's (1992) community college retention model; Tinto's (1975, 1987a) student integration model; and Weidman's (1989a, 1989b) undergraduate socialization approach. Vincent Tinto (1987a) and Ernest Pascarella (e.g., Pascarella & Chapman, 1983; Pascarella &

Terenzini, 1983) investigated college-student retention extensively in four-year colleges. Therefore, their employment of college-impact modeling was especially timely for the current studies.

Vincent Tinto.--Tinto (Fox, 1986; Tinto, 1975, 1982, 1987a, 1987b,; Tinto & Wallace, 1986) developed a conceptual model for college student attrition. Tinto believed that successful retention predictions depended upon the relative contributions of

> . . . not only background characteristics of individuals . . . but also expectational and motivational attributes . . . [and] educational expectations and their institutional manifestations . . . (Tinto, 1975, p. 93).

To predict or enhance retention for Tinto, colleges disaggregated the contributions of (1) background or input variables; from (2) initial student institutional commitment; from (3) academic and social integration; and from (4) long-term goals and intentions (see Tinto, 1975, p. 120). These variables affected sequentially and/or interactively student

decisions about persistence. Tinto's pivotal reliance on student academic and social integration was reminiscent of Astin's (1984, 1985, 1993b) "involvement" and Pace's (1984) "quality of effort" (also see Pascarella & Terenzini, 1991, p. 53) concepts.

Tinto's (e.g., 1975) pioneering empirical and theoretical efforts made student-attrition more manageable for administrators shaping college policies and for researchers assembling a complex empirical puzzle. But, in time, Tinto's student integration model was refined statistically by Pascarella.

Ernest Pascarella.--Pascarella's path-model tested Tinto's construct and utilized the attrition research of Lacy (1978), Pace (1979), and Weidman (1984) and statistical methods like structural modeling (see Pascarella & Terenzini, 1991, p. 53).

For Pascarella (1985), college-student cognitive development resulted from the direct and indirect (or mediated) causal-effects of five (5) "classes" of variables. Student (1) background characteristics and (2) salient institutional features (e.g., size)

interacted with the third variable class, (3) the institution's environment. These variables, in turn, affected the fourth cluster, (4) the student's interactions with faculty and college peers. The fifth variable-class, (5) the quality of student effort, was directly affected by the student's background characteristics, the institution's environment, and socializing experiences. The model's vectors converged ultimately at Pascarella's outcome assessment, "learning and cognitive development" (e.g., retention decisions).

Pascarella and Chapman (1983; also see Pascarella & Terenzini, 1983) tested Tinto's (1975) college-attrition model in four-year residential institutions and in two- and four-year commuter institutions. Their aggregate sample included only full-time freshmen students (n = 2,326) who had voluntarily withdrawn after one year. Following Tinto (1975), Pascarella and Terenzini's predictive variables included (1) student background characteristics (e.g., age; SES; gender); (2) institutional characteristics (e.g., academic major; college enrollment); (3) academic integration

(e.g., first-year GPA; contact with faculty and peers); (4) social integration (e.g., participation in extracurricular activities); (5) institutional commitment; and (6) student commitment to graduate. Retention data was analyzed in two ways statistically.

First, Pascarella and Chapman's (1983) discriminant analysis of student-retention (n = 1,099) from four-year residential colleges predicted correctly 74% of the persistence decisions by first-year students. Second, retention data was re-analyzed as a multivariate structural model.

Pascarella and Chapman's (1983) path analysis of four-year residential college data indicated that retention-decisions were affected directly by graduation commitment, institutional commitment, social integration, and residential preference. Surprisingly, college GPA, typically a reliable predictor of student retention, was not directly linked to persistence. Institutional commitment influenced persistence decisions more than goal commitment; the effect of social integration was more pronounced than that of academic integration; and the effects of background (or

pre-college) student characteristics were mediated by college experience.

Summary.--Most empirical studies of college attrition are, unlike Astin (1993b) and Pascarella and Chapman (1983), limited to data from single institutions. Therefore, the results from most attrition studies are plagued with "suspicious" external validity.

Our empirical understanding of attrition is provincial although, ironically, it remains a pedestrian methodological and practical problem for American colleges and their students. Ultimately, colleges are left to their own resourcefulness.

" . . . each institution," Vincent Tinto (1987b) reminded a convention of personnel professionals, "must assess for itself the particular attributes of student departure from its campus (p. 8) . . . causes of departure [are] . . . as varied as the institutional settings from which it arises" (p. 4).

Hypotheses.--This project consisted of one quantitative (Study 1) and one qualitative (Study 2) study.

For Study 1, selected student-data from the Student Information System (SIS)(Information Associates, 1989) was entered as predictive correlates for first-year college student retention. The discriminant analysis (DA) was performed on (1) the corporate data set, (2) for males and for females, and for each of three (3) ACT-composite score levels. It was hypothesized that the results would confirm Step 1 predictors from the step-wise DA's in Roweton, Bare, and Barnes (1991), an earlier study of attrition for the same College.

For Study 2, semi-structured interviews were conducted with a stratified random sample of first-year male and female students from three ACT-composite score levels. These interviews, it was hypothesized, would suggest predictive variables not currently available in SIS student-files.

Method

Subjects

Subjects for Study 1 were all first-year students (n = 376) entering college initially in the fall of 1991. Subjects for Study 2 were from a stratified

random sample of thirty (n = 30) students from Study 1; five (5) female and five (5) male students were selected from each of three ACT composite score-levels.

Procedures

Study 1.--Twelve (12) variables were transferred from SIS student files to SPSS-X (1990) data files for statistical analyses. Nine (9) variables were retained for the discriminant analysis (DA) as predictors: (1) ACT composite score; (2) age; (3) ethnicity; (4) level of financial aid; (5) gender; (6) college grade point average; high school grade point average and (8) marital status (see Table 1). Retention (i.e., enrolled or not-enrolled after one year),

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Insert Table 1 about here

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the ninth (9th) measure, was the criterion or dependent variable. The six (6) DA's were performed on the total data set, on each gender subclass, and on each of three levels of ACT composite scores levels.

Study 2.--Thirty (30) randomly selected students from Study 1 were asked twenty-one (21) questions about

themselves and their first-year college experiences (see the Appendix). The order of questions varied except for Questions #1 which was always posed first. Question #1 probed initial college selection.

The questions explored several dimensions from Tinto's (1975, 1987a) student integration model, e.g., background variables, academic and social integration, institutional commitment, and re-enrollment plans. These semi-structured, individual interviews occurred in April and May, 1992 and were conducted by a graduate student. Each interview lasted thirty minutes or less and was conducted publicly in the Student Center. Interviews were taped for subsequent analysis.

Results

Study 1

Subjects.--One year following admission, SIS records indicated that the 1991 first-year class consisted of 376 total students; females (55%) outnumbered males (45%). They averaged almost 19 years old and ranged from 17 to 52. Collectively, their ACT composite scores averaged almost 22 (n = 354, M = 21.81, and their mean college GPA's (n = 361, M = 2.41)

were somewhat lower than their average high school GPA's (n = 287, M = 3.13). See Table 2.

Insert Table 2 about here

On average, females (n = 207) were slightly younger than males (n = 169), but, academically, females averaged slightly higher ACT composite scores, and high school and college GPA's See Tables 3 and 4.

Insert Tables 3 and 4 about here

Ethnically, almost 96% were Caucasians while the remainder were Asians (n = 5), Hispanics (n = 5), and Native Americans (n = 6). See Tables 5 - 8.

Insert Tables 5 - 8 about here

ACT composite scores for females, males, and the ethnic groups were similar to national data for students entering college in the fall of 1991. See Table 9.

Insert Table 9 about here

Retention rates.--Over all, 75% of the first-year students who registered initially in the fall of 1991 re-registered one year later for one or more hours . See Table 10.

Insert Table 10 about here

Comparing persisters and non-persisters, retained students had on average higher ACT composite scores, and high school and college GPA's, and they were slightly younger. See Table 11.

Insert Table 11 about here

Stratifying retention rates by gender, ACT composite score, and ethnicity yielded a disparate pattern. First, females (75%) were slightly more likely than males (73%) to re-register. See Table 12.

Insert Table 12 about here

Second, students scoring highest on the ACT were more likely to return (88%) the second year than students scoring in the interquartile range (73%) or in the lowest quartile (69%). See Table 13. Third, as Table 14 indicates, Caucasian students are the most likely ethnic group to re-register.

Insert Tables 13 and 14 about here

Discriminant analysis (DA).--The DA's utilized primarily continuous, pre-college (or input) variables. The DA's were performed on the total class data one year following matriculation, on female and male cohorts, and on each of three (3) ACT composite score levels.

1. For the total class, the step-wise multiple regression analysis identified three (3) statistically significant predictors: college GPA, ethnicity, and marital status. See Table 15.

Insert Table 15 about here

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2. The DA for data stratified by gender yielded similar results. For females (see Table 16), college GPA, ethnicity, ACT composite score, and marital status were significant predictors. Only college GPA and ethnicity reach statistical significance for males (see Table 17).

Insert Tables 16 and 17 about here

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3. One additional variable, the student's level of financial assistance, emerged as a statistically significant predictor when students were subdivided into three ACT score levels: lowest 25% (n = 103); middle 50% (n = 161); and the top 25% (n = 90). For the lowest quartile (see Table 18), three (3) variables--college GPA, high school GPA, and ACT composite score--were significant predictors. For the interquartile range of scores (see Table 19), ethnicity, college

GPA, ACT composite score, and level of financial aid were effective predictors of one-year retention. Last, for the top 25% (see Table 20), ACT, college GPA, and level of financial assistance were statistically significant predictors.

Insert Tables 18 - 20 about here

Classification rates.--Classification rates signified the level of statistical success in correctly predicting whether a particular student returns or not one year following first-year enrollment. Classification rates ranged from 76% for students with middling ACT scores to 87% for those scoring with the highest ACT scores; see Table 21.

Insert Table 21 about here

Study 2

Subjects.--Thirty students randomly selected from Study 1's cohort (n = 30) were contacted by phone to

arrange for individual interviews. During these phone conversations, the purpose of the interviews was described, and fifteen (n = 15) agreed to participate. Three (n = 3) missed their scheduled appointments and, therefore, were not interviewed. Of the twelve (n = 12) interviewed, eight (n = 8) were female, and four (n = 4) were male. Students from each of the three ACT composite score levels were interviewed. See Table 22.

Insert Table 22 about here

Summary.--Nine (9) themes reoccurred in the responses from the twelve (n = 12) respondents. First, financial concerns (e.g., tuition, scholarships) substantially affected college selection and persistence. Also mentioned as important to college selection was, second, the college's proximity to student hometowns, and, third, recommendations by parents and high school teachers. Fourth, about goals, half focused on immediate concerns like "good" grades while half were motivated by long-range employment targets. Fifth, explanations of student attrition

included family "problems," grades, and/or money. Sixth, the students were most likely to obtain emotional support from parents although siblings, boy/girl friends, and other family members were also mentioned. Seventh, almost all respondents reported positive social integration into campus life. Their affiliations with other students was, on average, less troublesome than their associations with faculty. Quoting one female student from the lowest ACT quartile, "Many teachers don't want to help you; they are too concerned with their own work." Many, however, reported that faculty were helpful. Eighth, most felt that high school had prepared them intellectually; all but one agreed that college was more difficult academically. Ninth, and last, no student was contemplating discontinuing their College education although several wondered about campus life at larger schools.

Discussion

Study 1

Results support the hypothesis that statistically significant correlates of one-year retention would be

consistent with Step 1 predictors identified in Roweton, Bare, and Barnes (1991). In fact, results reveal remarkable correspondence.

Measures of academic performance in eleven (11) of twelve (12) DA's were the most predictive Step 1 correlates of one-year retention. See Table 23. Likewise, high school GPA's dominated

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Insert Table 23 about here

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statistically in Roweton, Bare, and Barnes (1991). The widespread predictive power of GPA and other academic assessments were not unusual. In fact, GPA's statistical pre-eminence remains even when predictions move beyond one-year retention to degree-completion.

> Pascarella and Terenzini (1991, p. 388) concluded:
>
> . . . undergraduate grades are perhaps the single best predictor of obtaining a bachelor's degree and also of attending graduate or professional school and obtaining an advanced degree.

The psychological value of high school and college GPA's as reliable and valid predictors are questioned,

of course (see, for example, Astin, 1991), but Astin, given GPA's empirical durability, moderates his opinion:

> . . . it should be pointed out that undergraduate GPA is positively related to nearly all measures of cognitive and academic [college] growth . . . even after the effects of all other input, environmental, and involvement measures have been controlled. What this tells us is that the GPA, despite its limitations, appears to reflect the student's actual learning and growth during the undergraduate years. (Astin, 1993b, pp. 241-242)

Pre-college student traits like high school GPA's (e.g., Anderson, 1986; Stoecker, Pascarella, & Wolfle, 1988) are especially outstanding predictors of retention.

> It is typically the case that student background characteristics (academic aptitude, prior achievement, family socioeconomic status, aspirations, personality orientations . . .) are . . . the best predictors of many of the outcomes associated with college. . . (Pascarella &

Terenzini, 1991, p. 658).

Pre-college traits are robust predictors, and some, like the high school GPA, are, at least, expeditiously available and reasonably reliable.

Alexander Astin (1993b, p. 188) writes:

> Consistent with hundreds of earlier studies, the two most important input [pre-college] predictors of the students' college grades in our [multi-institutional] 1985-1989 sample are the high school GPA and SAT verbal score.

Astin finds that the " . . . bulk of the variance in retention . . . can be predicted from . . . " (Astin, undated, p. 2) four (4) entering first-year student characteristics: (1) high school GPA; (2) admission test scores; (3) gender; and (4) race. Astin (1993a) feels, however, that colleges over-look the significance of entering student characteristics as predictors of retention but over-rate the effectiveness of their own retention programs.

Nonetheless, some substantial variance is <u>not</u> predicted from entering characteristics, and pre-college traits certainly do not reflect first-year

college experiences (e.g., Astin, 1991, pp. 351, 363, 398). Retention decisions, logic suggests, are traceable to both distal and proximal variables, many of which as Study 1's results indicate are not cognitive.

Study 2

Semi-structured interviews did suggest, as Study 2's hypothesis predicted, correlates of retention not now documented in SIS.

Study 2's data paint retention in personal tones. Students recount passionately how others, especially their parents, encouraged their attendance and supported them financially and emotionally. Finances are decisive factors to students, to their families, and to retention researchers (e.g., Cabrera, Nora, & Castaneda, 1992).

UCLA's Alexander Astin writes:

> SES has its strongest effect on completion of the bachelor's degree. It is important to emphasize that this and all other effects of SES are over and above the effects of all ability measures and other input characteristics . . . students from

> high-SES families can look forward to more positive outcomes in college, regardless of their abilities, academic preparation, or other characteristics. (Astin, 1993b, p. 407)

The over-riding importance of student interactions with their families about college costs reoccurs repeatedly throughout Study 2's interview data.

The effects of student-family relations on retention are largely ignored in attrition research. However, its importance to "school adjustment" is established empirically with elementary school children (Pianta, 1993) and with college students (Lopez, 1991; Lopez, Campbell, & Watkins, 1989). Future investigations may trace causal connections between familial factors, a student's developmental maturity, academic performance, and retention decisions.

Study 1 plus Study 2

Together, Studies 1 and 2 present a more complete portrait of retention than either study would do alone. The insights from Study 2 complement the results from Study 1.

Study 1 is restricted to student-information

available on SIS. The SIS variables are limited to digital formatting, that is, to brief descriptive phrases and numbers. Furthermore, not all numerical variables are suitable for DA's.

According to Kleinbaum, Kupper, and Muller (1988, p. 562), " . . . discriminant analysis should be used only when the X-variables [or predictors] under consideration are continuous, with distributions that are not highly skewed." Variables not satisfying these criteria are suspect. Therefore, Study 1, like Roweton, Bare, and Barnes (1991), is restricted within SIS primarily to pre-college variables statistically acceptable to SIS.

> By requiring us to check boxes and fill in blanks, the standardized [i.e., digital] form admits only a limited range of formal, objective, and impersonal information, which in some cases is precisely what is needed to solve a particular problem. (Postman, 1992, p. 84).

Too often, statistical compatibility is confused with good science. The history of retention research may be repeating unfortunate lessons learned belatedly

by intelligence test evaluators. Franz Samelson (1993, p. 1053), upon reviewing JoAnne Brown's (1992) book, The definition of a profession, feels that ability testing is conditioned more by economics than by psychometrics:

> . . . I still believe that the invention of the multiple-choice format, enabling mass testing by minimally trained persons in contrast to the cumbersome Binet testing, played a bigger role . . . in selling testing to the schools. (Samelson, 1993, p. 1053)

Unfortunately, SIS's precollege variables, although concise, convenient, and quantitative, are not perfect predictors. The retention behavior of substantial numbers of students were not accurately classified. In Study 1, in fact, the retention decisions of about 25% of the students, that is, ninety (90) individuals, are incorrectly predicted. Thus, it seems, the predictions about retention will be enhanced by adding variables; personological factors may be prime candidates.

Conclusion

> It is always tempting to believe that one has invented the wheel when most studies may be more akin to polishing spokes. (Bean, 1985, p. 48)

Retention researchers must get "inside" student-decision psychology. Deciding to re-enroll in college may not be simply caused by GPA or finances; each student's perception and interpretation of events intervenes. Complex personal decisions follow the multivariate and longitudinal interactions of inside-events (i.e., development models) with outside-events (i.e., college-impact models).

Interpreting the balance between "inside" and "outside" factors is reminiscent of educational psychology's two-decade fascination with aptitude-treatment interaction (ATI) instructional research. Starting with Cronbach and Snow (1977), many believe that academic performance is maximized when individual student aptitudes are matched with opportunistic instructional techniques for, indeed, they interact. Jonassen and Grabowski (1993) reported that learner

aptitudes, the "inside" of this complex equation, reduces conceptually to six dimensions: (1) mental abilities; (2) cognitive controls; (3) cognitive styles; (4) learning styles; (5) personality types; and (6) prior knowledge. Unfortunately, systematically measuring aptitudes and engineering ATI matches are complex puzzles still resisting resolution.

In college retention studies, combining measures of development (e.g., familial "enmeshment") with external and convenient indices (e.g, GPA) may be worth the effort in spite of interpretive entanglements. Student GPA's, as in Study 1, may really be convenient but superficial substitutes for pervasive "internal" (personality) dimensions like developmental maturity.

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Appendix

Questions for Semi-structured Interviews

1. What or who affected your decision to attend college and to select the one that you did?
2. What, in general, determines a student's decision to stay in college, to transfer to another college, or to drop-out?
3. Was _____ your first choice?
4. What part did finances play in your decision to attend _____?
5. Did you feel that your high school prepared you for college?
6. Did you feel that you would be successful in college? Why?
7. Did you come to college with a particular goal(s)?
8. What particularly influenced your decision on a major?
9. Is it easy to make friends at this college?
10. Did freshman orientation help?
11. Has your involvement in campus activities helped?
12. What do you think about life in the dormitories?

13. What has been the quality of your academic experience at this college?

14. What about the faculty?

15. Has your advisor been helpful?

16. Are the courses that you need (or want) available?

17. Compare this college to others?

18. Have you faced college stressors for which you were not prepared?

19. Who provides emotional support and encouragement for you?

20. Have you thought about transferring from _____ or dropping out?

21. Why is a college education important?

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Footnotes

[1]The author gratefully acknowledges the assistance of Dr. Charles Bare with the discriminant analysis; Ms. Vickie Grant who conducted and recorded the semi-structured interviews; and Ms. Mary Martha Muck for her insightful editorial appraisal.

[2]LISREL 7 is available on Chadron State Colleges SPSS-X software.

Table 1

Variables from SIS

Type	Name
Predictor (input)	ACT composite score
	Age
	Ethnicity
	Financial aid
	Gender
	GPA, college
	GPA, high school
	Marital status
Criterion (output)	Retention status

Table 2

Composite cohort description, 1991-first year students

Variable	N	Mean	SD	Range
ACT composite	354	20.81	3.84	12 - 31
Age	376	18.78	3.53	17 - 52
GPA (high school)	287	3.13	.54	1.25-4.00
GPA (college)	361	2.41	.86	.08-4.00

Table 3

Female cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	198	20.99	4.15	12 - 31
Age	207	18.66	3.39	17 - 45
GPA (high school)	172	3.24	.52	1.36-4.00
GPA (college)	199	2.55	.90	.24-4.00

Table 4

Male cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	156	20.57	3.42	14 - 30
Age	169	18.92	3.69	17 - 52
GPA (high school)	115	2.96	.53	1.25-3.92
GPA (college)	162	2.25	.77	.08-4.00

Table 5

Asian cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	4	18.50	1.73	17 - 21
Age	5	18.60	1.34	17 - 20
GPA (high school)	2	2.66	.65	2.20-3.12
GPA (college)	5	2.21	.60	1.59-3.12

Table 6

Caucasian cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	340	20.94	3.83	12 - 31
Age	360	18.77	3.58	17 - 52
GPA (high school)	278	3.14	.54	1.25-4.00
GPA (college)	345	2.45	.85	.08-4.00

Table 7

Hispanic cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	5	16.60	3.21	13 - 21
Age	5	18.20	.45	18 - 19
GPA (high school)	2	2.61	.71	2.10-3.11
GPA (college)	5	1.85	.64	1.17-2.78

Table 8

Native American cohort description, 1991 first-year students

Variable	N	Mean	SD	Range
ACT composite	5	17.40	2.88	14 - 21
Age	6	19.83	2.56	18 - 24
GPA (high school)	5	2.73	.64	2.02-3.55
GPA (college)	6	1.28	.19	1.08-1.61

Table 9

ACT 1991 Composite Scores

Category	Chadron State College	Nation*
Gender		
Female	21.0	20.4
Male	20.6	20.9
Ethnicity		
Asian	18.5	21.6
Black	---	17.0
Hispanic	16.6	18.4
Native American	17.4	18.2
White	20.9	21.3
Total	20.8	20.6

*Source: The Nation: Students (1992)

Table 10

Composite retention rates

Status	N	%
Not retained	98	25
Retained	298	75
Total	396	100

Table 11

Composite mean retention profile

	Status	
Variable	Retained	Not Retained
ACT	21.21	19.59
Age	18.06	18.70
GPA (high school)	3.19	3.03
GPA (college)	2.59	1.98

Table 12

Retention percentages by gender

	Status	
Variable	Retained	Not Retained
Female	75%	25%
Male	73%	27%

Table 13

Retention percentages by ACT quartile

	Status	
Variable	Retained	Not Retained
Lowest quartile	69%	31%
Interquartile range	73%	27%
Highest quartile	88%	12%

Table 14

Retention percentages by ethnicity

	Status	
Variable	Retained	Not Retained
Asian	60%	40%
Hispanic	60%	40%
Native American	17%	83%
White	75%	25%

Table 15

Discriminating variables for Fall, 1991, first year students

Step	Correlate	Wilks' Lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	GPA college**	.90466	23.87	.85	.81	.00
2	Ethnicity**	.87825	7.71	.55	.48	1.18
3	Marital status**	.87199	1.87	.20	.24	1.73

*Minimum F-to-enter/maximum F-to-remove = 1.000

**p = .0001

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Table 16

Discriminating variables for Fall, 1991, first-year female students

Step	Correlate	Wilks' lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	GPA college*	.95760	2.07	.65	.42	.00
2	Ethnicity*	.92892	4.55	.64	.56	1.38
3	ACT*	.91507	1.93	.65	.41	.10
4	Marital status*	.90528	1.65	.31	.34	1.92

*Minimum F-to-enter/maximum F-to-remove = 1.000

*p < .01

Table 17

Discriminating variables for Fall, 1991, first-year male students

Step	Correlate	Wilks' Lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	GPA college**	.76498	28.21	.95	.93	.00
2	Ethnicity**	.75098	2.43	.38	.31	.75

*Minimum F-to-enter/maximum F-to-remove = 1.000

**p = .001

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Table 18

Discriminating variables for Fall, 1991, ACT lowest quartile students

Step	Correlate	Wilks' Lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	GPA college**	.85385	14.98	.85	1.04	.00
2	GPA high school**	.82817	2.75	.00	-.49	.00
3	ACT**	.80531	2.07	.30	.43	.24

*Minimum F-to-enter/maximum F-to-remove = 1.000

**p = .001

Table 19

Discriminating variables for Fall, 1991, ACT interquartile students

Step	Correlate	Wilks' Lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	Ethnicity**	.94217	5.70	.64	.60	1.43
2	GPA college**	.90535	4.64	.59	.55	.00
3	ACT**	.87943	2.49	.51	.41	.29
4	Financial aid**	.87041	1.22	.30	.29	.00

*Minimum F-to-enter/maximum F-to-remove = 1.000

**p = .001

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Table 20

Discriminating variables for Fall, 1991, ACT highest quartile students

Step	Correlate	Wilks' Lambda	F-to-remove*	Pooled within group correlation	Standardized coefficients	Unstandardized coefficients
1	ACT**	.94159	4.51	.59	.44	.44
2	GPA college**	.86997	5.80	-.49	-.77	.00
3	Financial aid**	.84656	1.77	.48	.70	.00

*Minimum F-to-enter/maximum F-to-remove = 1.000

**p = .001

Table 21

Classification rates

Discriminant Analysis	%
Total class	77
Females	77
Males	78
Lowest ACT quartile	80
Interquartile ACT range	76
Top ACT quartile	87

Table 22

Semi-structured interview sample

ACT Score Range	Female	Male	Total
Lowest 25%	2	1	3
Middle 50%	2	0	2
Top 25%	4	3	7
Total	8	4	12

Table 23

Step 1 Correlates in Roweton, Bare, and Barnes (1991) and Study 1

Discriminant Analysis Data-set	Roweton, et al. (1991)	Study 1
Class	High school GPA	College GPA
Females	High school GPA	College GPA
Males	High school GPA	College GPA
Top 25%	English ACT	ACT composite
Middle 50%	High school GPA	Ethnicity
Lowest 25%	High school GPA	College GPA